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THE  
FOOD OF THE PEOPLE:  
A  
RETROSPECT AND PROSPECT.

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NOW we shall be fed is a question the importance of which cannot be over-stated. The character of our food is intimately associated with the nature of the mechanical or mental work we are engaged in, and our means of living. Two important facts at once engage our attention, and these are the rapid increase of the population causing an enlarged demand for food not only in Great Britain and Europe, but in those countries which have hitherto been regarded as the granaries of Europe, and the other is the migration of the agricultural labourers into the towns. The continued depletion of our rural districts is a circumstance to be regretted, but as this is occurring equally in other countries in Europe as well as in America, it cannot be due to the operation of Free Trade to which some have attributed it, nor to insufficient capital, excessive rent, and insecure tenure, though these may not be without their influence. Within the last ten years it is estimated that in Britain alone not less than 2,000,000 of the rural population have left their native villages and made their way to already over-congested mining, manufacturing, and commercial centres. Verinder\* states that the percentage of the population engaged in or supported by agriculture in England and Wales in 1851 was 23·7; in 1861, 20·9; in 1871, 16·5; and in 1881, 13·2. There has, therefore, been a steady diminution of farmers, agricultural labourers, and shepherds. Albert Shaw† reminds us that

\* "Workers on their Industries."—*Verinder*.

† "Municipal Government."—*Shaw*.

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English urban life is now almost equal to three-fourths of the whole population ; that in Scotland there are three townspeople for every one in the country ; that in France, though the tidal movement has been less marked owing to the low birth-rate, the urban population is equal to 40 per cent of the whole ; and that in Germany and Holland the stream of human life has been townwards. Large tracts of land that formerly used to grow wheat are passing out of cultivation ; and whilst this is taking place there is an annually increasing number of mouths to be fed. It is several years since Britain attempted to feed her own population—to-day she would find it difficult to do so for more than a very limited period. In 1854 our growth of wheat was 140,000,000 bushels ; in 1894 it was only 61,000,000 bushels—in other words, a smaller amount was grown to supply a population of 38,000,000, or two-thirds larger than it was in 1850. The population of the whole of Western Europe is growing at a greater pace than formerly. How it is to be fed is becoming a difficult problem. Food and men have for years been travelling in opposite directions. The stream of European migration has been westwards ; the direction of flour and food-stuffs eastwards. In 1840 Europe produced 80 per cent of the wheat of the world ; at present she produces 56 per cent. In the interval the United States and colonies have quintupled their production.

According to Parkes,\* one pound of bread per head is consumed per day by the European races. This is equal to an annual consumption of nearly  $5\frac{1}{2}$  bushels of wheat. A bushel of wheat, roughly speaking, weighs 60lbs. ; this yields four-fifths of its weight of flour, and 100lbs. of flour make 140lbs. of bread. If, therefore, five bushels of wheat are required by each individual per annum, and the average crop is thirty bushels to the acre, each acre of corn land will be capable of supporting six people. Hitherto we have depended largely upon the United States for our wheat, but already most of the best land in the States has been absorbed, and in order to meet by wheat alone the requirements of its yearly increasing population, which is equal to 1,250,000, it is necessary to bring annually under the plough 208,000 acres of land—an extent of surface equal to our county of Huntingdon. But as all this cannot be land devoted only to the growth of wheat, probably double would be required, say 400,000 acres, an extent of surface equal to 625 square miles.

To the serious consequences of an increasing number of corn-growing counties of England going out of cultivation and an increasing population in the United Kingdom must be added the rapid stride of the population in the United States, and the deficient yield per acre of that country's soil, which is only 13 bushels

\* "Manual Practical Hygiene."—Parkes.

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instead of 30 to the acre as mentioned previously.\* Five to six hundred square miles of fertile land will produce sufficient wheat to support each million of the population, but since the yield per acre in the United States is only 13 as against 30 bushels, we must therefore double the figure so as to allow 1,000 square miles for the support of each million. At first sight these numbers appear extravagant, and yet when we consider such an old country as France, with its well-tilled fields and its industrious peasantry, we find a population of 38,000,000 unable to find sustenance on its 204,092 square miles, and obliged to import more food in the form of grain and flour than it exports as wine, fruit, vegetables, &c. In France 5,000 square miles of soil are required for each million of the population. If, therefore, the annual increase of the population in the United States is 1,200,000, and the yearly addition to the population of Western Europe is admitted to be 1,400,000, then in these two parts of the world alone we have two and three-quarter millions of new mouths to be fed annually, and all this in the face of such a circumstance as the continued exodus of the rural population into the towns. Back to the land, but on more equitable terms, is the cry heard in our own country, and with work there awaiting willing hands the industrial tension in our large commercial centres would be somewhat lessened. The agricultural capabilities of our land have never yet been tested to the full, and whilst to many the rapid increase of the world's population is appalling—a growth proceeding not in an arithmetical progression, or equal increments in equal times, but geometrically, like compound interest, so that larger and larger numbers are added in each successive period—there need be no immediate fear, for the resources of the American wheat fields, though not without limit, have never yet been reached, there still remaining, according to reliable authorities, in the United States alone 660,000,000 acres (1,000,000 square miles) awaiting cultivation, and in Canada 200,000,000 acres of uncultivated land.

The rapid growth of population in the United States, with its increased consumption of food, obliges us to turn naturally to Canada. It is unwise that Britain should feel herself dependent for food-stuffs upon the United States. Controlling the market, as the States necessarily would, she could force this country to submit to terms not altogether agreeable or acceptable. On the other hand, the value of American produce depends upon her export; competition by Canada therefore favours cheap flour. Parkin† shows to what an extent Canada may yet be relied upon for wheat

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\* "Studies in Statistics."—*Longstaffe*.

† "The Great Dominion."—*Parkin*.



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and farm produce. In the far North-West there are signs of great agricultural activity. For 30 or 40 cents a bushel of wheat can be carried to Liverpool. The market for Canada is England, and not the United States. Canada has room for 1,000,000 more agriculturists on its soil—there being in Manitoba alone 360,000 square miles, or 230,000,000 acres, of which only 1,000,000 is under cultivation. With all this possibility for fuller agricultural development there need be, at present, no alarm as regards the growth of food for our increasing population. Atkinson\* makes it the theme of his book that while consumption by man as regards the means of subsistence is limited, the power of material production, or the power of mankind to direct the forces of nature to the purpose of sustaining human life in comfort and welfare, is practically unlimited. The anxiety of the disciples of Malthus is not yet confirmed by facts. During this century the food of civilised nations has rather increased than diminished, and that too at a rate faster than the increase of population—an indication that in this particular respect the material welfare of mankind has certainly advanced.

With such an outlet as Canada and the United States for our overgrown populations, the question naturally arises—why don't more of our sons and daughters go there—why don't they return even to our own rural districts? The present century has witnessed a great change in our social and industrial life. It is the age of contrasts—enormous wealth and absolute poverty; a feverish race for gold, and the dullest apathy through loss of heart—asserting individualism and militant socialism. Personal discontent and social unrest are abroad to-day. The verities of the economic doctrines of the older schools are being questioned, and are sought to be supplanted by theories based upon sentiment rather than experience, upon what might be than upon what would be if our social conditions were completely reorganised. The hard life of the toiler, the long hours of the artisan, his insufficient wage and imperfect food, and the general unhealthy conditions under which too often the labourer is forced to live, form a group of facts which, when strongly presented to him and contrasted with the luxuries enjoyed by those whose wealth he is said to have created, tend to rob labour of its dignity and reward, and cause toil to be regarded as slavery. Rural life, with all its natural beauties, has ceased to have attractions for men and women who have once come under the feverish spell of the social life of the towns of to-day. It is too quiet for such. The village heart beats too slow, and is not in touch with the rapid pulse of the towns. In spite of the fact that life can be

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\* "Industrial Progress of the Nation."—Atkinson.

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lived under healthier conditions, the purchasing power of money and the means of maintaining life greater in our villages, the tendency is still for the stream of rural life to flow onwards to the towns. Some day there will have to be a pulling-up and a social reorganisation. New values will have to be assigned, the standard of which must not be measured by wealth. Greater simplicity of life will become a necessity, and personal ability and noble character the first step in the ladder of social life. Industrial competition is blamed as the cause of depression in trade through over-production, and is regarded by the labourer as the cause of his small wages; yet competition pervades all classes, and exists through all phases of human life. It is this element in our social life which, creating a feeling of aspiration, urges the individual to larger effort, and ends by evolving bad as well as good traits of character. It makes a man unhappy in his quiet village home. He sees others socially surpassing him in the race of life; he, too, must therefore venture into the city, and rise into affluence with the ebbing tide, or sink into obscurity with its fall. In spite of all these circumstances there are yet many for whom rural life has attractions, and who, provided work can be got, labour fairly remunerated, suitable house accommodation found, and an interest given them in the land they cultivate, are wishful to again become sons of the soil.

Whilst agriculture has declined, it yet occupies a prominent place in the affairs of the nation. It is our oldest industry. The conditions under which it has been carried on for centuries and the social life of the peasantry have formed the groundwork of many a page in history. Agriculture is the most important industry of mankind, for, without counting India and China, it gives employment to 80,000,000 people, represents capital to the extent of £23,000,000, and produces annually £4,000,000,000. It is from the peasantry, therefore, that we learn something of the evolution of feeding, for in our diet, just as in our moral, industrial, and social life, there has been a gradual transition from the lower to the higher—from the coarser food of our ancestors to the refined and delicate meals of to-day. It is impossible to say definitely what was the diet of primitive man, but in all probability it was vegetable food and fruit, as these were within his reach, and would not require cooking. On the other hand, infants then, as now, would be brought up at the breast. Milk would therefore form an important item in the dietary of the primeval child. In the Bible we are told of Abel being a keeper of sheep, and Cain a tiller of the ground, so that to vegetarianism at this period must have been added the consumption of animal food. Certain kinds of grain have been found in the tombs in Egypt, also wheat in mummy-cases, and olive oil, still liquid, in sealed vases at Thebes, facts which allow us to infer as to the kind

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of food used by the Egyptians. The discovery of loaves of bread, blackened through the separation of their carbon, amongst the ruins of Pompeii, still retaining their shape, and bearing inscriptions as to the method of their manufacture, give us some insight into the food of the Romans, further details of which exist in the literature of the period and in the pictorial representations on the walls of the wealthy Pompeians. The presence of the bones of the deer and the pig, of oyster and mussel shells at the Chesters, a Roman camp near Hexham, on the banks of the Tyne, indicate that the soldiers of the Roman garrison knew the value of animal food, and had a variety of it. In the kitchen-middens of Scandinavia, and in the waste heaps beside the lake dwellings of Switzerland and Savoy, are the *débris* of bones, oyster shells, fish hooks, also fruits and grains in excellent preservation, all of which bear testimony to the mixed character of the food of an age long gone. From the peat around the lake dwellings of Pfaffikon, in the canton of Zurich, there is considerable evidence that animal food was largely used. These dwellings were built on piles covered with planks, and as no metal was used by the builders they are of great antiquity, for they belong to the stone age anterior to the bronze or iron period, and therefore of considerable interest.

In our own country, so far as the feeding of the people is concerned, we need scarcely go beyond the years of the first agrarian rebellion, which shook feudalism and weakened the relationship of landlord and villein. The legislature at this period still recognised as just the "Law of Settlement," whereby the peasantry were tied to a particular district and could not wander without consent. The State had undertaken to establish a wages tariff, so that a money equivalent might exist for services rendered. At this period of mediæval peasant life 13s. 3d. and a suit of clothes formed the annual remuneration of a bailiff in husbandry, and a shepherd received 10s. Having determined the wages, it became necessary for the State to regulate the price of corn, and with this the size of the labourer's loaf of bread. A sliding scale was in operation at the time of Henry the Third (1216-72), which regulated the price of bread; but at this period the food of the common people was coarse and wanting in variety. Wheaten bread was not always within the reach of the labouring classes. Garnier\* says that it was composed of a mixture of oats and tares, or oats and peas, of wheat and rye, or of oats and barley. The wealthier classes were able to procure wheaten bread. As a result of this coarse but wholesome food our mediæval rustics were men of excellent physique, looked upon with admiration by warlike kings as forming splendid fighting material, and so long as

\* "Annals of the British Peasantry."—Garnier.



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the supply of labour did not exceed the demand, and seasons were favourable and epidemic disease absent, prosperity reigned amongst the toilers. A hundred years after the Black Death (1349), the purchasing power of an English labourer's wages were twice what it was in Edward the Third's reign (1327-77). Along with this financial prosperity came a repugnance towards the coarse food of a day gone by—a tendency to regard with contempt "penny ale and bacon," and a claim for fresh meat and fish. The "golden age" of the agricultural labourer was about to dawn—a period marked in history as the fifteenth century and the first quarter of the sixteenth—when, according to Thorold Rogers, "food was so abundant and cheap that it was no great matter to throw it in with the wages." The fact that our mediæval forefathers were in receipt of 4d. a day as wages, conveys no idea of their prosperity. At this period a man was capable of maintaining himself upon 6d. to 8d. a week. The agricultural labourer purchased many of the necessaries of life at one-twelfth the price of the seventeenth century and bread at one-eighth. When wheat, barley, and rye became scarce through wet seasons, peas, beans, tares, and lentils became substitutes for human food. Where a family was thrifty the housewife generally had salted meat in the bacon rack. For the meal at noontide a hot rasher of salted meat, with cabbage—rather a scarce vegetable at this period—an onion, or a leek, was usually cooked. It was washed down by a swill of ale, for few contented themselves with the teetotal beverage of the age, composed of water, honey, and spice, and known as swish-swash. The long course of salted food throughout the winter, with an insufficiency of green vegetables, too frequently told upon the health of the peasantry, so that with the advent of spring there also came scurvy. Poor as was the dietary of the English peasant at this period, it compared most favourably with that of the French rustic, whose food was apples, brown bread made of rye, no animal food but a little lard, occasionally the entrails of animals slaughtered for the nobles, and their drink water. So heavy was the taxation and so arduous the labour of our Gallic neighbours that they became bent at an early age and feeble; they lived in extreme poverty and misery, unable to defend themselves against disease or national foes; all of which, be it noted, occurred in a realm the most fertile in Europe.

The work of the English peasantry has always been hard, and their hours of toil long, particularly in the seventeenth century, when men began work at four a.m. and were not free to retire until nearly nine o'clock at night.

Towards the end of last century wheat was gradually becoming the food of the people, but to more than one-half of the population it was still inaccessible. Two-thirds of the food in the northern

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counties was composed of rye and oats, whilst barley was the food of the majority of the people in Wales. In Leeds and the surrounding districts oats were the substitutes for wheat, and in Newcastle-upon-Tyne rye; in Alnwick, Rothbury, and Belford a mixture of barley and peas; whilst in other districts it was barley, rye, peas, and beans. The favourite English dishes were crowdie, peas kail, skilling—so called from skilling or shelling of the oats—and clap bread, from all of which wheat was absent, and yet, poor as this dietary was, it was still superior to that of the French peasantry, who in the poorer districts were living upon roots, cabbages, and chestnuts. Oaten cake at this period formed a conspicuous part of the dietary of the Scotch. The meal was made into bannocks, so called from the Gaelic word “bonn,” meaning a round piece of money, or into clap bread, because it was clapped or beaten out with the hand when in the condition of dough into large round cakes on a board like the “fladbrod” met with in Norwegian cottages to-day, and then placed upon the girdle, still a homely utensil in all Scotch cottages. The Scotch housewife took greater pains with the cooking of food, was much less extravagant than her English sister, and she succeeded in converting cereals into various kinds of cakes, thus earning for her country the title of “the land o’ cakes.” If there was any fault to find with the English labourers in the early part of the last century, it was that their daughters, then as now, were not taught to cook. They could not bake, nor were the farmers’ wives and daughters in England adepts at butter or cheese making.

A hundred years ago the seasons had been above the average, prices were high, but wages were abnormally low. The poor rate was heavy, but in all other respects the prospects were favourable. At this time commenced the Corn Law agitation, by which the attention of the authorities was drawn to the possible relationship between the price of bread and that of labour. The price of bread had increased one-third, whilst labour had only advanced one-seventh. Attempts were made to force Parliament to pass a Bill regulating a minimum wage in accordance with the price of bread, but again and again the Bills were thrown out. The public mind had become imbued with the idea that the prosperity of the labourer depended upon the cheapness of corn, hence the repeal of the Corn Laws became only a matter of time. Once, however, this scale allowance system was adopted in a parish, the people who were idle shared equally with the industrious. This squandering of the public money was not remedied until 1834. At this period bacon, beer, and white bread were within the reach of the English labourer, and unless he got these he was discontented; but in Scotland oatmeal and milk supplied the wants of the cottar. One circumstance which was regarded as favourable to the Scottish peasantry was the fact that

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they were largely paid in kind. It contributed to sobriety and frugality. This method of payment still lingers in certain parts of Northumberland, in Ayrshire, and other parts in the south of Scotland. It frequently includes permission to keep a pig, cow, or fowls, and to cultivate a piece of ground for potatoes and other vegetables, all of which whilst tending to promote domesticated habits become an additional source of profit to the individual. Improvements in agriculture, however, have only been slowly brought about in Scotland. Potatoes, for example, which were cultivated in gardens, were not planted in the fields until 1740. In the Highlands there was great antipathy shown to their use as articles of diet, and it was not until prejudice was overcome by starvation that our northern countrymen began to eat the starchy tuber. Turnips, which were introduced into England in 1716, began to be cultivated in Scotland in 1739, and then not broadcast as now. They were used in Edinburgh first at dessert. In the seventeenth century agricultural Scotland was not at all in a prosperous condition.\* The peasantry were badly fed, seldom tasting animal food. Oats, barley, meal, and kail were their principal food, and fermented whey their drink. Nearly all my readers are familiar with the definition of oats given by Dr. Johnson, viz., "A grain which in England is given to horses, but in Scotland supports the people"—a statement which drew from Lord Elibank the retort, "But where will you find such horses and such men?"—a remark clearly indicating, apart from its patriotic feeling, the nutritive value assigned to oats by his lordship. Agricultural improvements were gradually adopted all over Scotland, and added to the prosperity of the nation. Contented with their lot, and their children enjoying the blessings of an excellent education supplied by the Church schools, the Scottish peasantry gradually became consolidated as a class whose sons have never ceased to play an important part in the welfare of the nation. The same remark applies, but in a less degree, to England. From some of the poor cottages in England men have arisen, like Cobbett, who have played an important part in public life.

Increased wages, cheaper commodities, and the comparative ease with which the necessities of life are obtainable, have improved the dietaries of the working classes; trade-unionism and the stimulus to industrial activity having also tended to the consolidation and improvement of the social status of the artisan class. Whilst the introduction of machinery has increased production and diminished prices, and given employment to larger numbers of the people, it has broken up our home life by utilising female labour and by abolishing

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\* *Scottish Review*, January, 1895.—H. G. Graham.



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household industries. Improved machinery has also cheapened the price of bread ; it has refined the quality, but not improved the nutritive value of wheat flour. It is a long leap from the simple hand-mill of early Biblical times, such as the two circular flat stones of the ancient Egyptians to the modern system of milling by iron rollers of to-day. The Egyptians of a later period, while owning mills driven by bondsmen, possessed water-mills as well ; and it is known that on the banks of the canals that conveyed water into Rome flour mills were located. At this period slave labour was largely employed. Animals, too, were utilised, but both of these were subsequently replaced by obtaining motive-power from water or wind, the first windmills being erected by the Venetians. For the utilisation of water as the driving power of the corn mills in this country we are indebted to the Romans. The same principle or method runs through the milling of all nations—the Egyptians, Greeks, and Romans, down to our own day—so far as stone mills are concerned. It is impossible to state with perfect accuracy the date at which steam began to be used in corn mills, but it is believed that it was towards the end of last century. Within our own day a great change has come over milling. In 1863, in Buda-Pesth, in Hungary—now the greatest milling centre in Europe, if not in the world—iron rollers were substituted for millstones ; and although the change was gradual and practically unnoticed at the time, this supersession of the millstones by the new method, which compresses the wheat between steel and porcelain crushers, has completely revolutionised the industry. The doom of the millstone was thenceforth sounded, and forthwith flour roller-mills began to be built in England, Germany, France, and America. Now came the opportunity of the capitalist to launch out into schemes requiring foresight, boldness, and money, and thus was dealt a damaging blow to the prosperity of the old corn mills of this country. Palatial mills have been erected here and there, fitted with costly machinery, so that the art of milling has become a science. A visit to the splendid Co-operative Flour Mills at Dunston-on-Tyne quite opened the eyes of the writer to the enormous strides made in this industry. Workmen under the new *régime*, though perhaps no better paid for their services, yet follow their avocation under healthier conditions. Although there is still a considerable degree of flour dust, there is much less of it than formerly, so that the liability to pulmonary diseases on the part of the modern flour miller cannot be so great as it was in the case of millers a few generations ago. The improved methods of milling have given us a flour particularly pleasing to the eye. It is beautifully white, but because it has removed the layer of nitrogenous cells which lie underneath the bran—that part which is richest in albumen, and most capable, therefore, of reproducing all



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the tissues of the body—and given us proportionally more of the starchy material useful only for evolving muscle-force and developing fat, it is to that extent less nutritious and poorer generally than the wheaten flour of five to six decades ago. America, Hungary, Egypt, India, and the colonies supply us with large quantities of wheat, but the grain from these sources does not necessarily make better bread than that obtained from English soils. The most nutritious flour, in my opinion, is that which is still met with in some of our rural districts, obtained from British wheat and ground in local mills. It is darker than the American and less pleasing to the eye, but it is better fitted for feeding the labourer. This statement may be disputed, but I know of no facts which force me to think otherwise. In "Mulhall's Dictionary of Statistics" the nutritive value of the United States flour is placed at 145 as compared to the English reckoned at 100. The same authority is responsible for the statement that 7lbs. of American flour are equal to 8lbs. of English flour as regards bread-making. English wheat is not inferior to the American grain. A blow, however, has been struck by improved flour milling at what is the greatest necessity of life by having reduced the nutritive value of flour—a circumstance the importance of which is not sufficiently realised in these days of cheap bread.

The present price of milk and potatoes is not such that they are quite beyond the reach of the poorer working classes, but in many a home animal food is still a luxury. Whilst flesh meat is beyond the range of the very poor, it is eaten largely by the well-paid artisan classes, by many of whom, however, its true value is not sufficiently appreciated. There is undoubtedly greater waste of animal food amongst the labouring classes than there ought to be, a circumstance for which the wives and daughters are largely responsible. The art of cooking is as yet unknown in many a working man's family, whose daughters, considering the opportunities now afforded them of attending cooking classes in our large industrial centres, are blind to their own personal interests and advance in life by refusing to learn this homely duty. Preferring to remain ignorant, they subsequently make the homes of our working men unattractive, and their meals not only uninviting but expensive. There is no doubt, and this word of advice is offered for the serious consideration of those daughters of our working men whose circumstances may be such as to oblige them to enter domestic service, that as time goes on women who are good cooks will receive larger and larger salaries. They will become, as they ought, the best paid of all domestic servants. It is interesting to know, as regards animal food, that its consumption has increased in England. In 1840, 87lbs. per inhabitant were consumed; but in 1888 the amount had risen to

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109; whilst in France, during the same year, the number of pounds weight were 43 and 77 respectively; in Germany, 60 and 64; whereas in Russia there was a declension, the numbers being 67 and 51 respectively.

A healthy man requires, according to Kelet, per annum—

	Lbs. Food.	Containing lbs. of Albumen.
Man .....	1,600	100
Woman .....	1,200	75
Child .....	900	50

and the man's food is made up thus:—

	Lbs. Food.	Lbs. Albumen.
Animal food .....	290	28
Vegetable .....	1,310	72

A man's daily food should contain at least  $\frac{3}{4}$  oz. of nitrogen and 11 ozs. of carbon, the proportion of which contained in the food of certain classes is as follows:—

	Per Week.	
	Nitrogen (ounces).	Carbon (ounces).
English peasant .....	7.7	120
Irish „ .....	4.	168
French „ .....	6	150

whilst of flesh meat, of the total quantity of food taken the

Irish peasant consumes .....	1 per cent.
French „ „ .....	7 „
French sailor „ .....	25 „
English navy „ .....	28 „

The proportions of nitrogen and carbon contained in bread and meat are—

	Nitrogen.	Carbon.
Bread .....	1	30
Meat .....	3	10

The people in this country are the best fed in Europe, a circumstance largely due to the importation of food and cattle from foreign countries and the cheap rate of freights. Not only is the food better and more varied, but it is also cheaper. The Americans in this respect, however, are still in advance of us. Whatever may be the price of other commodities, the American working man has the pull over us as regards the price of his food. Food of all kinds, including fruit, is plentiful and cheap in the States and Canada. Whilst as a nation we are the best fed in Europe, the Americans are the best fed in the world. Their consumption of food is enormous, yet in spite of this so great are their resources that the United States still produce 30 per cent of the grain and 33 per cent of the meat of the world.

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The cost of a workman's food in various countries in 1880 was, approximately—

	Shillings per Week.		Percentage of Food Cost.
	Food.	Wages.	
Great Britain .....	14	31	45
France .....	12	21	57
Germany .....	10	16	62
Belgium.....	12	20	60
Italy .....	9	15	60
Spain .....	10	16	62
United States .....	16	48	33
Australia .....	11	40	28

Whilst the quantity and quality of food that an individual eats is regulated by the amount of money he can afford to spend upon it—that is, by the wages he receives—and its variety is ruled by this circumstance and proximity to the markets, there are certain definite lines upon which a dietary should be constructed so as to meet the wear and tear of the body—a dietary which must in all respects be ample. The subject naturally divides itself into (1) what is the best food for the infant, (2) the growing boy, (3) early manhood, and (4) the hard-working and fully-developed man. The ignorance exhibited by the wives of the poorer working classes as regards the feeding of infants and youths is notorious. It is partly the explanation of the large infantile mortality of our industrial centres and of the reduced stamina of the people in after years. The effects of imperfect feeding upon our youths are not so apparent when we casually meet individuals in the street. It is when they come to a hospital in ill-health, or when they are examined for the army and navy, that we observe them. Newcastle-upon-Tyne is a large recruiting centre. Discussing the subject of recruit acceptances and failures for the army with one of the surgeons at the barracks a few months ago, I learned some interesting facts bearing upon the physical development of the young men of this locality. The recruits are rejected to the extent of 56 per cent. They have weak chests, are undersized, and generally speaking are delicate, owing to the ill effects of overcrowding and bad feeding. This is a high percentage of failures, and compares unfavourably with some other districts. The surgeon in charge of the Maryhill Barracks at Glasgow informs me that the rejections there are 21 per cent, and at York Barracks the rejections are 56 per cent for the army and 54 for the militia. At Preston, Lancashire, 28 per cent of the recruits are rejected. The army surgeons at all these centres are unanimous in their opinion in regard to the causes of the failures. They are due to imperfect development of chest and limbs, and are consequent upon want of nourishment when young. Of the recruits rejected, 43 per cent in some places and 29 per cent in Newcastle owe their failure



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to such physical defects as under chest measurement, height, and weight. Early loss of the teeth is in some centres a noteworthy defect. Surgeon-Major Macneee, of York, considers that the excessive smoking and early chewing of tobacco in factories contributes to the malnutrition of the recruit. The results of recruit examinations convey fairly accurate information as to the feeding of the poorer working classes. All army surgeons are agreed that the best recruits are still obtained from agricultural districts. As children they may have been more coarsely fed, but they are well nourished, have a better physique, are more plastic, and have better moral fibre than the youths brought up about town. From the iron-making districts, where wages are high and food plentiful, good recruits are obtained, provided they are not too old, and have therefore not been too long at work for the hard labour to have told upon their heart. Parliamentarians who plead for an eight hours day in certain laborious occupations, and particularly for restricting child labour, could scarcely find better support for their arguments than the fact that the recruits drawn from the coal-mining districts are very many of them rejected, especially in early adolescence, owing to their having been put too early to work in the pit, and kept there too long daily. Once, however, they have reached the age of twenty and have been receiving for a time good wages, and thus been able to procure sufficient food, fewer of them fail as recruits. It is an interesting and notable fact, no matter where recruits have been drawn from, that once they are drafted into the army and come under the influence of regular hours, stated meal times, and good food, they increase in weight rapidly.

The feeding of young infants is a subject of the greatest importance. It cannot be too strongly stated that *milk is the natural food of the infant*, and that if the mother is in good health, and comes from a family free from the taint of consumption, and possibly can nurse her child, she ought to do so at least for a few months. Should she be unable to do this, then cow's milk, diluted with two-thirds of water in the early days of infancy—gradually adding more milk and less water as the child grows older, with a teaspoonful or two of lime water, scrupulous attention being paid to keeping the feeding bottles clean—will be a good substitute for the mother's milk. It is the greatest cruelty to young infants to give them bread, or bread and tea, or starchy food of any kind. The digestion of starchy food begins in the mouth where the spittle or saliva by a peculiar ferment action converts starch into sugar, which is assimilable and useful to the body, but the infant has no saliva containing this ferment, nor in the other portions of the alimentary tract are there those juices which are capable of dealing with such starchy foods as "boiley," &c. The fact that these ferments are in the early weeks of infantile life



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absent in the alimentary canal is a clear proof that nature not only never intended starchy foods should be taken, for they cannot be digested, but that they are harmful and become a menace to life by causing convulsions. After the sixth or seventh month the objection to them becomes lessened, for nature is slowly developing the ability on the part of the child to deal with stronger food.

As for the schoolboy, the plainest but wholesome food, and plenty of it, should be given, and at regular intervals. Oatmeal porridge, bread, large quantities of milk, animal food once a day, potatoes, rice, &c., and plenty of sugar should be given. It is a mistake to deprive children of the use of sugar and of pure sweets, for sugar is a muscle-force producer. The secret visits of the schoolboy to the toffee shop is a craving of nature which should be gratified within limits. The likes and dislikes of children as regards their food should certainly be considered, for their physical development at this particular time is one of the most important affairs of their life. Upon the foundation laid at this period the superstructure has to be reared. No child, for example, should be obliged to prepare lessons in the early morning, particularly in winter, without first receiving a light breakfast or a tumblerful of warm milk and a piece of bread. These remarks apply with even greater force to the feeding of girls than boys, for they, particularly at the latter term of girlhood, develop quicker than boys, and ultimately upon them is placed the greater share in the burden of reproduction. The development of the system at this age should be met by plenty of easily-digested and assimilable animal food, not less than four ounces daily, and by a sufficiency of well-cooked vegetables, farinaceous and fatty material.

What is food for the boy and girl will suffice for early manhood, only more of it will be required generally, greater variety, and more animal food particularly. Growth stimulates the appetite, and this must be met. Leaving the subject of the feeding of young men, I shall say a few words on behalf of the girls. At the age of fourteen, in this country, or thereabouts, nature imposes a tax upon their constitutional resources which, while it marks their entrance into womanhood with all the possibilities that the name implies, is on the other hand a function, the proper performance of which is not only consistent with health but is accompanied by increased development. The menstrual discharge is under any circumstances an impost. It makes its appearance at a time of life when girls go to service, to the factory, or become shop assistants, at a time of their life, therefore, when the greatest attention should be paid to their food and the nature of their employment. At the menstrual epoch nature demands rest for the individual, yet at this particular period girls employed in factories and shops are obliged to stand the whole day through, breathing too often a vitiated atmosphere. Small

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wonder that so many of them become pale and anæmic, owing to their blood becoming thin, watery, and deficient in colouring matter. Greater consideration should be shown at these periods to girls.

Hitherto we have been dealing with young people to whom food is necessary for growth and development. When we come to consider food in its relation to men who are fully developed and have practically ceased growing, but whose occupation is laborious, a new question presents itself, viz., what is the function of food and what purpose is served by it in the economy? As the tissues are fully grown, food can only be necessary for the maintenance of the body weight, for replacing the waste caused by wear and tear, for the production of muscle-force, and the maintenance of heat. Food is fuel for the engine, only the human engine, unlike the physical machine, is continually integrating or building up as well as disintegrating or breaking down. The principal destiny of food within our system is the liberation of force. Our diet is composed (1) of proteid or nitrogenous substances, such as meat, milk, eggs, and bread; (2) of carbohydrates, like potatoes, rice, bread, peas, &c.; and (3) of hydrocarbons, or fats, such as butter, oil, &c. Years ago the German chemist Liebig attempted the solution of the relation of food to heat and mechanical work. He regarded nitrogenous foods as muscle-force producers, and carbohydrates and fats as heat producing and respiratory. For a period his views were accepted, but there has gradually been growing amongst physiologists the opinion that Liebig's teaching was too exclusive, and that the carbohydrates of our food probably play a larger part in the liberation of muscle-force than do proteids; and that proteids, like carbohydrates, may be oxidised and consumed in the system without having ever entered into combination with the tissues. Proteid is found in the system in two forms—(1) as fixed, and forming an integral part of the tissues; and (2) as fluid, and circulating in the blood, and therefore capable of being used up without any effort on the part of the body. Setting aside water, which is so essential to all vital phenomena, and which constitutes 75 per cent by weight of the body, and the influence of saline material such as common salt, we shall deal with the question of nitrogenous, proteid, or albuminous foods. Our muscles contain a large quantity of nitrogenous material. It was Liebig's opinion that when work was done the nitrogenous material of muscle underwent combustion—that it was destroyed, in fact—the waste being thrown off by the kidneys in the form of a chemical substance called urea, the quantity of which in the urine might be taken as a measure of the disintegration of muscle. If this were the case, the daily elimination of urea would be increased by muscular exercise, but experiment proves that this is not the case. Laborious muscular

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work may even be accomplished upon food not rich in nitrogen, so that whilst we admit that it is necessary for all who are engaged in hard manual labour to take animal food, it would appear as if the oxidation of carbohydrates and fats in the system was the source of the muscle-energy liberated. Parkes, in his experiments upon young soldiers, demonstrated that muscular work, for a short time at least, could be accomplished without nitrogenous diet. That muscle wastes during work there is no doubt, and the probability is that if albuminous foods are withheld the muscle substance disintegrates. Labour that is prolonged and severe in its strain upon the muscular system can only be done well for a very few days upon a non-nitrogenous diet. It is admitted that muscular force is largely the outcome of the oxidation of carbohydrates and fats in our food, and does not simply come from the oxidation of the nitrogenous elements in muscle, and yet if animals are kept upon a pure carbohydrate diet they rapidly lose weight and die from breaking up of their tissues. Two pounds of bread per day will supply sufficient nitrogen for the needs of the economy, but it will not maintain life without the occasional addition of animal food. All the world over the cravings of the human race are only satisfied by nitrogenous food, and the amount of nitrogen consumed stands in relation to the amount and character of the labour performed. It is said that carnivorous animals are stronger and have greater enduring powers than herbivora, and that they are fiercer in disposition. Playfair tells us that the bears of India and America which feed upon acorns are mild and tractable, whilst those of the polar regions that consume flesh are savage and untameable. The Peruvians whom Pizarro found in the country at its conquest were gentle and inoffensive. They subsisted chiefly upon vegetable food, whilst their brethren in Mexico, when first observed by Cortes, were a fierce and warlike race, feeding mostly upon animal diet. The Hindoo navvies employed in making the Bhore Ghat Railway found it impossible, owing to their laborious work, to maintain their health upon a vegetable diet. Freeing themselves from the influence of caste, they ate the common food of the English navvies, and were thus enabled to work with vigour. It is owing to the rich nitrogenous and fatty diet of the English navy that he is superior to the Frenchman, and it is owing to the absence of it that the Irish peasant is inferior to the Scotch. In order to build up our muscular system nitrogenous foods are a necessity, but for the liberation of muscle-force, carbohydrates. To this subject, however, we shall return. All we need say here is that in the formation of our dietaries we act wisely by selecting a combination of the three classes of foods, for they aid each other in their digestion, absorption, and oxidation in the body.



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Careful determination of the heat production values of different foods have been made. Fatty substances like butter and cheese stand highest as calorific foods. Then come oatmeal and wheat flour, followed at no great distance by peas and sugar. Lean beef and ham have only one-fourth the heat-producing power of butter and cheese. The human body seldom expends in muscular force the full equivalent of that capable of being evolved from its food. It is estimated by Helmholtz that the actual labour of a man is one-fifth of the mechanical force of his digested food, an interesting fact when compared with Lord Armstrong's calculation of the steam engine, in which only one-tenth part of the actual power of the fuel is realised as work.

A working man's dietary is influenced by the amount of money he can spend upon it, and his proximity to the markets. The food he eats should be so framed as to sufficiently replace the nitrogen and carbon which he loses daily from his system. A man engaged in hard physical labour necessarily requires more and stronger food than the clerk or the recluse. Two pounds of dry solid food, with a liberal quantity of water, are required daily. Upon a prison punishment diet of 1lb. of bread per day, with water, a man will lose in three days 3lbs. in weight—just a pound a day—and he will look pinched. This quantity of bread represents 1·3oz. of nitrogenous matter and 8·8 of carbonaceous, or 88 grains of nitrogen and 1,975 of carbon. This is a hard diet, and seldom resorted to beyond just a few days, and yet many a poor sempstress goes on toiling all day long, plying her needle to keep body and soul together, upon 1½lbs. of bread and a little dripping or a scrap of bacon. A man's food should contain daily not less than 4,300 grains of carbon and 200 of nitrogen, and a woman's at least 3,900 and 180 grains respectively; and these are represented by 22ozs. of carbonaceous and 2·97ozs. of nitrogenous food. The dietary of women is one-tenth less than that of men engaged in indoor occupations, and one-third to one-fourth less than the larger dietaries of men engaged in outdoor labour. Needlewomen are the worst fed, and their food is expensive since it consists of bread, bacon, and tea.

In the "Diet of Toil" \* I give a series of diet tables of the various working classes, and on comparing them with the standard physiological requirements of Moleschott, which is 309 grains of nitrogen and 4,632 grains of carbon, I find that a diet which contains 324 grains of nitrogen and 5,190 of carbon, and is spoken of as a fundamental English diet, can be obtained for a shilling. It is composed of 1lb. bread, ½lb. meat, ¼lb. fat, 1lb. potatoes, half-pint milk, ¼lb. eggs, and ½lb. cheese. This may be taken as a fair average diet, one

\* "Diet of Toil."—*T. Oliver*. Published by J. M. Carr, Newcastle.



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which all might aim at, but which from its price is still beyond many a wage-earner. Taking two English agricultural labourers in Wiltshire, whose wages, A, are 13s. 9d. a week and no children to support, I find that he gets 210 grains of nitrogen and 5,783 of carbon daily: whilst B, whose wages are 14s. with six children to support, three of whom are working, only consumes 123 of nitrogen and 5,379 of carbon. I find, too, that an Ayrshire ploughman, whose wages are 15s. a week and with five children to support, none working, eats 346 grains of nitrogen and 5,686 of carbon. Two Irish peasants similarly consumed, A, 247 grains of nitrogen and 3,387 of carbon; B, 170 of nitrogen and 4,081 of carbon.

Coalminers require good food, and they get it. One is struck by the large amount of carbon which is present in their dietary; also in that of navvies. Taking two average coalminers, A, whose wages are 55s. a fortnight, eats daily 339 grains of nitrogen and 6,071 of carbon; whilst B, with 40s. wages per fortnight, consumes 339 and 5,657 grains respectively. Iron and steel workers with wages 35s. a week consume 278 grains of nitrogen and 4,645 of carbon daily, and a steel smelter 238 and 4,544 grains respectively. Female lead workers are extremely poor, and are badly fed. Taking an average couple, whose wages are each 2s. 6d. a day when working, A consumes 49 grains of nitrogen and 2,297 of carbon, while B takes 72 of nitrogen and 2,107 of carbon. Female cotton spinners, with their regular employment and higher wages, do better, viz., 262 grains of nitrogen and 3,781 of carbon. In Bradford the male woollen workers whose wages are 18s. a week will consume 219 grains of nitrogen daily and 3,411 of carbon; whilst those with larger pay, 32s. a week, take 368 grains of nitrogen and 5,138 of carbon. Compare with these the following two starvation diets:—(1) that of a groom recently under the writer's care in the Newcastle Infirmary, whose wages were 5s. 3d. a week—his daily consumption of nitrogen was 109 grains, and of carbon 1,605; whilst (2) a poor sempstress, with 8s. a week, consumed only 46 of nitrogen and 1,760 of carbon.

In the Red Van Reports for 1893\* is given the domestic budget of a country labourer in Berkshire, whose wages are 13s. a week, with a free cottage, a wife and two children to support, and whose expenditure just balances income. On looking at the items detailed, one is struck by the deficiency of meat and fat in the dietary, and the almost total absence of milk. I gladly support the Secretary of the English Land Restoration League in his condemnation of the absence of milk from the dietary of young children in *districts almost pastoral*. It is a serious defect in the domestic budgets of the agricultural labourer, and a circumstance not at all

\* English Land Restoration League Reports.

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creditable to those living in the country and with the means of remedying it. The local wants of a rural district should receive as much consideration from the milk suppliers as the people living in the towns. The milk question is very important. In the coal-mining villages near Newcastle, many of which are practically speaking in the country, there is less milk consumed than there ought to be. There is a difficulty of getting it. In the case of the Cleveland ironstone miners, Dr. Messenger, of Salthurn, tells me that the absence of milk from the dietary of the children is woeful. Into many of the houses in this rich agricultural district not more than a pennyworth of milk, *i.e.*, half a pint, enters daily, and this is meant to supply the wants of five or six children. The consumption of Swiss condensed milk has greatly increased all over England, but however valuable it may be as a substitute, it is not meant to replace permanently cow's milk if at all obtainable.

As a country we produce a large quantity of milk. Take for example the needs of London alone, and it is estimated that 87,000 cows are required to produce the 953,000 pints of milk to feed those living in the metropolis, an amount which gives one and one-half pints daily for every family of seven, or almost one-quarter of a pint per head of the population. The railway companies offer considerable facilities for the conveyance of milk to London, but in spite of that there are twenty-nine of the large cities of England, each with a population over 100,000, which are more easily reached by the milk vendors than London—hence the cost of carriage and distribution within them is less. For these twenty-nine towns it is estimated that 134,000 cows are required to produce the 1,204,300 pints of milk that are consumed daily. Although the amount of money we spend upon milk is enormous, yet, as a nation, we don't spend enough. It is believed that more milk is consumed in this country now than formerly. Twenty years ago, Morton, at a meeting of the Society of Arts, told the Londoners that only one-eighth of a pint was consumed per head of the population. At present it is double this, but still it is not enough where there are children—besides, its distribution is not equal. The poor people do not and cannot get a sufficiency of it.

Hard work requires good food. Bread, bacon, and cheese form the staple articles of the dietary of English rural labourers; oatmeal porridge, milk, bread, potatoes, and meat are the food of the Scottish peasantry; whilst in the dietary of the Irish, potatoes figure too largely, and were it not for the bread made of Indian meal and wheaten flour, their diet, poor as it is, would be little above starvation level. Since it is upon the nitrogenous elements in our food

\* *Newcastle Daily Chronicle*, 3rd and 4th June, 1895.

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that value is placed as sustaining agents, and upon the carbohydrates as muscle-force producers, it is apparent that of all the agricultural labourers the Scotch are the best fed, and the Irish the worst. Unfortunately the use of oatmeal in Scotland is dying out, and the children of the peasantry to-day are not receiving the sound wholesome fare of their immediate progenitors, but are consuming too much tea and bread, alike to their own detriment individually and collectively to the physical deterioration of the race. The value of carbohydrates as muscle-force producers is seen in the dietaries of the coalminers and the English navy, and the contrast in food between the indoor workers of cotton and woollen factories with those engaged out-of-doors is striking. I have had little experience of the dietaries of fishermen. Their work, though not laborious, is hard. It makes a considerable call upon their physical endurance and their ability to withstand exposure. The Rev. Mr. Bryson, of Holy Island, has supplied me with several facts relating to their domestic life. With wages reaching from 15s. to 16s. a week, they are unable to procure butcher's meat daily. To some extent fish replaces it, and during the winter months the stock of herrings previously laid in almost entirely replaces butcher's meat. Even amongst this hardy fisher folk a change has crept in over their dietary. Formerly they consumed large quantities of brown bread and oatmeal, but these are disappearing before white bread and tea. I am not aware that the fishermen along our coasts have suffered in consequence of eating fish over lengthened periods. It is to this circumstance that the leprosy of the Norwegians is attributed; but in my visits to the Lepers' Hospital at Bergen and discussion of the subject with the physicians, and in my conversations with clergymen in some of the remote districts in that country, I found that amongst a peasantry noted for its industry, integrity, and frugality there were in operation, in addition to the consumption of dried fish for several months of the year, the influence of heredity, the effects of long-continued intermarriage, moist climate, the reducing effects of repeated wettings, and the imperfectly ventilated homes of many of the people. The disease, therefore, probably owns more than one cause.

The cheap price of bread, thanks to Free Trade, has been one of the greatest blessings to this country. With a two-pound loaf selling for 2½d., flour at 11d. to 1s. 7d. per stone, butter at 1s. and 1s. 1d. per lb., and mutton at 4d. to 10d. per lb., our people, young and old, can be well fed.\* The average Englishman spends more upon his food than his fellow of other nationalities. An Englishman

\* Figures kindly supplied by Mr. H. R. Bailey, Co-operative Wholesale Society, Newcastle.



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spends annually upon food £9. 12s.; a Frenchman, £9. 8s.; a German, £8. 8s.; a Spaniard, £6. 12s.; an Italian, £4. 16s.; and a Russian, £4. 12s. Our countrymen are the largest meat eaters in Europe. The average Englishman consumes 109lbs. of meat in the year; Frenchman, 87; German, 64; Italian, 28; and the Russian, 51. Of bread we are the smallest eaters. The Englishman's average is 380lbs. annually; Frenchman's, 540; German's, 560; Spaniard's, 480; Italian's, 400; and the Russian's, 635. We rely for our sustenance upon meat and fat, upon bread and starchy or sugary foods, the relative consumption of which, expressed in terms of carbon and nitrogen, is seen in the epitomised table of the daily diet of well-fed operatives by Playfair.\*

	Carbon (grains).		Nitrogen (grains).
1. Tailors .....	5,136	.....	325.
2. Blacksmiths .....	6,864	.....	437.
3. English navy .....	8,295	.....	482.
4. Prize-fighter (training) .....	4,366	.....	690.
5. Soldiers (in peace) .....	5,246	.....	297
6. Soldiers (in war) .....	5,561	.....	381.

Our soldiers are well fed, but how fares it with those who are also State-supported in our prisons and workhouses? The position of an agricultural labourer earning his own livelihood when compared with that of the inmates of certain workhouses in the country is extremely interesting. Each male inmate of the Bradfield Union Workhouse† costs the guardians 6s. 1½d. per week, each female 5s. 6½d., and each child 5s. 1d. If adverse circumstances compelled a family—taking, for example, the one mentioned in the Red Van Reports—to remove to the workhouse, it is stated that their maintenance would cost the guardians £1. 1s. 10d. per week, whilst outside at home this has to be accomplished on 13s., the wages of the head of the family. It is natural in this democratic age for the cry to be raised that those who either from their own fault or poverty become chargeable to the ratepayers—above all, those who are in prison—should not be better fed than those who are honestly trying to make a living for themselves and their families. Apart from the parochial and financial aspect of this question, it has a moral side that cannot be ignored. Accurate information is therefore desirable. It is not the first time this subject has disturbed the public mind. A few years ago there was a greater misspending of public moneys than now, but, apart from that, dietetic conditions

\* *Lethby* on "Food."

† "Red Van Reports," 1894, p. 10.



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were in operation in our prisons and workhouses which acted so deleteriously upon the inmates that an investigation became necessary. The mortality was much in excess of what it ought to have been, and to Sir Edwin Chadwick\* we are indebted for information upon this particular point. It was recognised then, as now, that paupers and prisoners worked less than agricultural labourers; but were they healthier for this privilege? Investigation showed that so far as health was concerned the balance of advantage was in favour of the agricultural labourer, underfed even as he was. Sixty years ago we had a prison population of 25,000, with a daily sick list of  $9\frac{1}{3}$  per cent. The weekly cost varied from 1s. 2d. to 7s. per head. It was demonstrated that according to the scale of diet so were the sick and mortality rates. In the lowest series, when the cost of each prisoner was 1s. 10 $\frac{1}{4}$ d. per week, the percentage of sick was 3 per annum, and the mortality 1 in 622; in the second series, where the cost was 3s. 2d. a week, the percentage of sick was  $23\frac{1}{2}$  per annum and the mortality 1 in 266; whilst in the intermediate series, whose cost was 2s. 4 $\frac{1}{2}$ d., the number of sick per annum was 1 in 18, and the mortality 1 in 320. It was believed that the dietaries regulated the amounts of sickness and mortality. Where the period of confinement was long and the diet low the health of the prisoners was good, and that in all cases where the diet was lowest the sickness and mortality, too, were least. At this particular period prisoners were overfed; they were receiving 50 ounces of solid food per week more than the agricultural labourers, a circumstance not only unjust to the labouring population but unfair to the public generally. Too much animal food was at this time given to a class of men and women whose lazy, indolent, and vicious habits had placed them in a position where better food was supplied to them than they could obtain at home. The pendulum has swung pretty well to the other extreme, particularly as regards the feeding, in charitable institutions, of children. So far as our gaols are concerned the dietaries have all been carefully calculated, so that on the one hand no attraction is offered to outsiders, and on the other that it is consistent with health.†

Taking the facts as relating to Newcastle Gaol, I observe as the average dietary of prisoners awaiting trial that they are allowed bread, gruel and cocoa for breakfast; bread, and potatoes and cooked meat twice a week, for dinner; and for supper, bread, gruel and cocoa—an amount which equals 2,693 grains of carbon and 138 of nitrogen daily. After conviction the prisoner, according

\* "Health of the Nations," vol. i., p. 66.—*Chadwick*.

† In 1894 only nine deaths occurred in Pentonville out of 12,000 prisoners.

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to his term of imprisonment, is placed upon one of three sets of dietaries, the nutritive values of which may be expressed in the following terms:—

	Carbon.	Nitrogen.
No. (1) diet .....	2,371·5	136
No. (2) „ .....	3,369	183
No. (3) „ .....	4,909	217·5
No. (4) punishment diet ....	1,975	88

No. 3 diet is reserved for prisoners undergoing longer terms of imprisonment.

Tabulating the results of my inquiries into the feeding of the working classes and prisoners I obtain the following:—(T. OLIVER.)

	Carbon (grains).	Nitrogen (grains).
Moleschott's standard.....	4,632	309
Fundamental English diet ....	5,190	324
Agricultural labourer .....	5,783	210
„ „ .....	5,379	123·
Ayrshire ploughman .....	5,686	346
„ shepherd .....	5,200	376
Irish peasant .....	3,387	247
„ „ .....	4,081	170
Coalminer .....	6,071	329
„ .....	5,657	339
English navy .....	5,842	426
Iron and steel worker .....	4,645	278
Steel smelter.....	4,544	238
Female lead worker .....	2,297	49
Female cotton spinner .....	3,781	262
Male woollen „ .....	3,411	219
„ „ .....	5,138	268
Starvation diet (a groom) .....	1,605	109
„ „ (sempstress)....	1,760	46
PRISONERS, NEWCASTLE GAOL:		
Awaiting trial .....	2,693	138
Convicted No. (1) diet.....	2,371	136
„ No. (2) „ .....	3,369	183
„ No. (3) „ .....	4,909	217
Convicted, illbehaved—		
No. (1) bread and water ....	1,975	88
No. (2) improved dietary ..	2,871	138
No. (3) „ „ ..	3,455	147·

The diet of the best-fed prisoners in our gaols never reaches that which may be procured by the unskilled labourer. It is superior to that obtained by some of the Irish peasantry, and much better than that procurable by female lead workers and poor sempstresses.

I have carefully investigated the effects of the various dietaries upon prisoners, and although the amounts of carbon and nitrogen seem fairly large, it should be remembered that prisoners do a certain amount of labour or task toil, most of them having been sentenced “with hard labour.” The effect of the limited dietary

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and imprisonment upon them is quickly observed in the reduction in weight which almost invariably follows. It does not seem, therefore, as if there was anything extravagant in the feeding of prisoners in our time. However much an indignant public may have railed against prison mismanagement in past decades, there is at the present time no ground for complaint on the score of extravagance. Whilst the bare cost of the food of short sentence prisoners, calculated upon existing contract rates, without preparation, and subject to the fluctuations of the markets, ranges from 8d. to 1s. 0½d. per head per week, the cost of the inmates of workhouses is nearly 5s. per head. This, however, includes not only the price of food, but a percentage charge upon buildings, clothing, &c. The average cost per head of our paupers in the workhouses varies from 3s. 4d. upwards, an amount which exceeds that capable of being spent by agricultural or town labourers upon their family. It seems to me that there is still room for economy in the feeding of our workhouse populations without necessarily reducing the nutritive value of the food supplied. Our Boards of Guardians might take a leaf out of the book of the Peoples' Kitchens of Vienna,\* and our working men engaged in large factories might also learn how very cheaply they could be supplied with an excellent mid-day meal of three courses, if they would only amalgamate as has been done in Vienna, Bradford, and Liverpool. It is unnecessary to tell the story of the philanthropic efforts of Dr. Josef Kühn to establish restaurants in Vienna, at a time of great industrial depression, wherein food might be sold at the lowest prices possible to be self-supporting, and the admirable manner in which he has succeeded. School children there are not less carefully catered for than the sons of toil. Each dinner hour sees the restaurants filled with men and women of all classes—the pale-faced clerk and the begrimed artisan, the actor whose popularity is on the wane, the broken-down solicitor and the struggling student, the factory girl and her better-dressed sister of the shop—all alike being equally served and similarly waited upon. The pocket as well as the palate of consumers is respected, the dinners varying in price from six kreutzers (1½d.) to twenty-five (6½d.). Nor need we be in any sense of the word slavish imitators of our American cousins, yet there are many things we may learn from them. In the United States they have what are called the Peoples' Exchanges, institutions to which are sent every morning nicely-cooked dishes suitable for invalids. There must be many gentlewomen in our own country, upon whom reverse of fortune has told, who by their delicacy of taste and natural gifts, improved by a few lessons in

\* "Peoples' Kitchens in Vienna." *Nineteenth Century*, November, 1894.

*Edith Sellars.*



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cooking, might be able to add considerably to their income as well as confer a boon upon the sick of the lower middle classes did Exchanges of a similar character exist in England, and to which they could send specially-prepared soups, jellies, and other dietetic preparations. It is a movement which would be warmly supported by the medical profession, and which would benefit alike contributor and receiver.

The food of the working classes is necessarily determined by the wages of the bread-winners. In the "Diet of Toil," it is shown how the smaller the wage the greater is the amount spent upon food. The means of subsistence hits the poor the hardest. Engel\* tabulates the expenditure of the labouring classes in Germany, and shows that a workman whose annual income is from £45 to £60 spends 62 per cent of his wages on food; that a workman with £90 to £120 spends 55 per cent upon food; whilst a middle-class person with an income of £150 to £200 spends 50 per cent. Meinert also states that in Germany, where the wages are from 15s. 6d. to 21s. a week, 60 per cent goes for food; and that where the wages are 29s. per week 50 per cent, or 14s. 6d., is spent on the necessities of life. In my own cases I find that coalminers spend a very large part of their income upon food, that as much as from 60 to 70 per cent thus disappears; and that a navvy will spend 53 per cent. My experience of the toiling classes is that they spend from 50 to 80 per cent of their wages upon food, and that as the wages of the classes rise there is less spent proportionately upon food and more upon accessories, luxuries, &c. The poorer working classes cannot always spend 70 per cent of their wages thus, and ill-feeding is the consequence. The future of the toiling, as indeed of all classes of the community and of nations, is largely one of feeding. With an open market regulating supply and demand, and therefore influencing the wages of the producers, national supremacy in commerce becomes largely a question of physical fitness and mental superiority on the part of the industrial classes; and when we know how cheaply certain races of mankind, *e.g.*, the Hindoos and Chinese, can be fed and are capable of great endurance, there will arise considerable cause for uneasiness should British markets diminish through other countries developing industries that replace ours, and with decreasing agricultural returns in our own country. The Chinese, as a social and economic force, for example, will thus have to be reckoned with in the future. The cheapest rice forms a large part of their dietary, but as a people they are capable of eating almost anything, from a herring or a rat upwards; hence, when transplanted to other countries, they are capable of thriving upon

\*"Returns of Expenditure of Working Men." Eyre and Spottiswoode.



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food which other nationalities cast away. The negroes of Basutoland are muscular men, capable of performing hard work. Their food consists principally of ground maize made into a paste, and they seldom eat meat unless when a sheep dies. They drink fermented milk freely. Compared to the English who are resident in Basutoland, they are capable of performing hard work, have considerable enduring powers, and yet their wages are only 15s. a month. How much it takes to feed an individual is only part of the larger question of how much it takes to feed a nation. National expenditure is limited by income, which depends upon production and commercial exchange. We are of those who believe that the better an individual is fed the better work he will accomplish; but there are breakers ahead. As we may not be always commercially supreme, it might be well for us as a nation were the art of cooking better understood, so that there was less waste and a return to simpler and less expensive meals undertaken.

By food we mean anything which when ingested directly or indirectly helps the growth, tends to repair the body, or evolve energy. All diet should aim at presenting to the individual substances containing proportional quantities of carbon and nitrogen. This is best accomplished by an admixture of proteids, carbohydrates, and fats. We are not disposed to re-open here at any length the question of vegetarianism. My own opinion is that for an Englishman a mixed diet is best, that animal food taken in excess overloads the system with waste material, and also that an exclusive vegetable diet is not suitable for most people. There is an individual idiosyncrasy as regards food, hence the verity of the remark, "One man's food is another man's poison." Those men are best who make use of a mixed diet. Certainly in temper, forbearance with the faults and weaknesses of others, and in breadth of disposition they are far and away superior to the pure vegetarian, who is too frequently bigoted and intolerable of the habits and tastes of those of his fellow-men who do not happen to agree with him upon his particular fad. It has been maintained that carnivorous animals are superior to herbivora in rapidity of movement and endurance, the swift spring of the tiger being compared with the slow movements of the cow. Admitting that the character of the food influences the disposition of individuals, we must be careful in our conclusions as to the superior muscularity of one animal over another. Is the horse, for example, a slow animal, or is the deer wanting in fleetness of foot? Animal food probably gives greater enduring powers. Vegetables have to be taken in larger quantity than flesh meat, but there is little to show once the carbon and nitrogenous elements have been absorbed into the system that their potential energy is less quickly evolved than is that derived from animal food. In the contraction of muscle, physiologists

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recognise that it is not the nitrogenous elements in the muscles that are destroyed in the liberation of force but the carbohydrates, hence it is that while the ill-nourished Hindoo who has been principally fed upon rice has small muscle-force and little staying-power, his well-fed countryman nourished upon corn and peas is in the performance of laborious work little if at all inferior to the meat eater. There is no race of men who on their mountain sides at home, or on the battlefield abroad, have attracted more attention or have contributed more to the making and maintaining of the reputation of Britain than the Highlanders and the peasantry of Scotland, and yet they were principally brought up on oatmeal and milk. It is not, therefore, simply a question of the superiority of flesh over vegetables, but, to a large extent, the character of the vegetables eaten. The natives of Chili and Peru, who live principally upon succulent and watery fruits such as melons, &c., are a loose-fibred, easily knocked-up set of men; but this is not to be wondered at when their food is compared with such cereals as wheat, corn, and peas, which are all extremely rich in nitrogen. It depends, therefore, upon the nitrogenous values of the vegetables that are eaten. Vegetarians frequently say how much their health has improved since giving up animal food, but I have known strict vegetarians of some years' standing who have been obliged to give up their restricted dietary on account of feeling physically unfit for prolonged exertion and on account of general debility and anæmia.

It is the function of animal food and of all nitrogenous substances in vegetables to contribute to the making and repairing of the muscular parts of our body, but we cannot support Liebig in his generalisation that the mechanical force of the human body is entirely derived from its own combustion. It probably comes more from the oxidation of the various substances absorbed from the food, and circulating in the system, without having ever become integral parts of the tissues. In performing work the muscles are destroyed, hence the need of nitrogenous food and of increasing it when labour becomes harder. The individual may fall back upon the stored-up nitrogen in his tissues for a time, but exhaustion soon makes itself felt and a general unfitness is experienced, clearly indicating that, in addition to constructing and repairing the tissues, nitrogenous foods perform additional functions in the economy, *e.g.*, accumulative or force producing. When we speak of nitrogenous foods we mean such things as meat, bread, oatmeal, peas, &c. Wheaten bread, oatmeal, and peas contain large quantities of nitrogen and carbon, and are nutritive. Milk is a perfect food, especially for the young, since it contains all the elements necessary for their nutrition. The drawback to cereals is that they do not contain sufficient fat, hence the Scotchman adds milk to his

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porridge. Oatmeal is rich in phosphates, which are useful in forming bone ; it is therefore good for young children. If there is one circumstance that is indicative of race degeneration, due to want of proper feeding in childhood and the insufficient administration of bone-forming foods, it is the early decay of the teeth in the children of to-day. Too much tea and white bread are exercising an injurious influence. This is recognised by dentists in Newcastle, particularly in the case of girls who come from some of the country districts of Northumberland. A few years ago, when the food was coarser but still nutritious, their teeth were good ; but now, owing to the altered habits of our northern peasantry, the teeth decay early, and compare most unfavourably with those of girls hailing from Scottish homes where porridge and milk yet reign supreme.

From bread, oatmeal, peas, lentils, eggs, and milk, the working classes can obtain without great cost all that is necessary for their sustenance ; they ought to add to these, occasionally, animal food and fat. Fat undergoes rapid combustion within the system. It thus maintains the temperature of the body, and, like carbohydrates, it is a source of muscular energy. The bacon and beans of the English peasant form a substantial and wholesome meal. Potatoes are poor food. To some extent they have been a curse to Ireland.

Rice is a useful carbohydrate, but it is poor in nitrogen and fat. It forms too exclusively the food of the poorer classes in India. The Chinese cook it with other things. Rice has of late been received by the German army with considerable favour. All carbohydrates within the system become converted into sugar. It is upon this fact that their utility depends. In the disease known as diabetes people pass in the urine large quantities of sugar. From 4,000 to 10,000 grains of sugar may thus be eliminated daily, accompanied by a feeling of great muscular weakness and general prostration. Thus it is that all starchy foods, such as white bread, potatoes, &c., are interdicted to diabetics. These substances, practically speaking, feed the disease. By careful dieting we can reduce the amount of sugar eliminated. In India the effects of excessive carbohydrate consumption and imperfect dieting are very noticeable. One is struck by the prevalence of diabetes amongst the most promising men, intellectually, in that country. The educated and highly-refined Indians are not flesh eaters, hence this class suffers most severely, there being scarcely a family amongst the wealthier people in Calcutta and Ceylon but has lost one member from diabetes.

Since the ultimate form into which starchy food is converted in the body is sugar, it might be interesting to know what is the value of sugar itself as a nutrient. Sugar improves muscular work by

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from 6 to 39 per cent.\* In human blood there is about 1 per cent of sugar, but when the muscles are in a condition of activity it disappears from the blood four times more quickly than when they are inactive. This indicates that during activity sugar is used up. When it is added to food, men are capable of performing harder work. The coalminers in the North of England long ago found out its value as a muscle-force producer. They eat large quantities of it. All over the country the consumption of sugar has increased. When Ed. Smith wrote upon foods thirty years ago he estimated that 1,420,000 tons of sugar were consumed annually by the Anglo-Saxon population of England and America, giving an average of 41·4lbs. per head. Mr. Barber, of the Leeward Islands, in a recent paper,† states that in 1892 the world's production of sugar was close upon 50,000,000 hundredweight—that of this quantity half was obtained from the sugar cane grown in the tropics, and half from the beetroot of the temperate regions. At the present time the inhabitants of Great Britain and Ireland consume annually 72lbs. per head; those of the United States, 52lbs.; and those of Germany, 17lbs. Sugar is, therefore, a conspicuous article in our dietary. I have alluded to the coalminer's partiality for sugar, and the harder work he is capable of doing upon it. At schools it has been demonstrated that if several ounces of sugar are added to the food of the boys they are found to be capable of performing a greater amount of muscular exercise. However weak and starved negroes are when they begin to cut the sugar canes upon West Indian plantations, towards the end of crop time, as the result of the unlimited amount of cane juice they receive, and in spite of their hard labour, they are observed to be sleek and well fed. It is only within the last 100 years that beetroot has become a source of sugar supply. The cane was known in India long before the Christian era. The Sanscrit name *sarkura*, and the Arab *sukhar*, suggest its local habitat. I regard sugar as one of the most useful articles of diet. From its cheapness it ought to form an important item in the food of all classes, but particularly of those who are engaged in laborious muscular work. In support of my views upon sugar, expressed in the *Fortnightly Review*, October, 1894, Mrs. Main (formerly Burnaby), a well-known Alpine climber and authoress, wrote to me from Switzerland confirming the opinion I had given, and reminding me that Swiss guides are in the habit of taking with them on their long ascents jellies and chocolate. Since then I have discussed this question with several of the active members of the

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\* "Diet of Toil."—*Oliver*.

† "Knowledge," July, 1895.—*Barber*, Supt. of Agriculture, Leeward Islands.

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Alpine Club, in London, and they, too, tell me that during their long climbs they always carry with them jellies, raisins, and occasionally chocolate. Sugar has only about one-half the calorific and motor power of fat, but it is more palatable, and can be easily carried. I am not in a position to speak as to the superiority of one form of sugar over another. Theoretically, the order of merit is probably grape, cane, and beetroot sugar, but to settle this question numerous experiments would have to be undertaken and carried out over a lengthened period.

Upon the breakfast table of all classes tea, coffee, or cocoa is found. These are not foods in the proper sense, but accessories or beverages, which serve a useful but as yet unexplained physiological function, though probably acting as stimulants. The active principles of tea and coffee are theine and caffeine—alkaloids which are closely related in their composition to nervous tissue, hence their suitability for the repair and renovation of the exhausted brain. They certainly retard the waste of the tissues of the body, and we all know the pleasant and exhilarating effects they produce when we are tired. But there is a tendency nowadays to look upon tea as a food. With some people it replaces food. Easily infused, and when there is little appetite, sedentary, lazy, or thriftless people are apt to make tea, bread, and butter act as a substitute for a more sustaining meal. However useful as an adjunct to our dietary tea may be, the practice of taking tea five or six times a day is reprehensible. This vicious habit, though largely met with amongst the working classes, is by no means confined to them. I know of no practice that carries its own condemnation, or is fraught with greater risk to the development of the body, than that pursued in industrial centres where female labour is largely employed, *e.g.*, Lancashire, of bringing up young infants upon tea and bread. Malnutrition and a large infant mortality rate are the consequences.

Into the question of coffee and cocoa we need hardly enter.

To-day there is plenty of cheap food and a great variety of it within the reach of all except the very poor. The cheapest foods are by no means the least nutritious. Amongst the unskilled labouring classes small wages necessitate the greatest economy, and if the family is large proper food can scarcely be procured. Domestic circumstances therefore force children to work earlier than they otherwise would, and with physical frame and muscular powers scarcely equal sometimes to the task imposed. Wholesome and sufficient food is thus withheld at an age when it is most required. Small wonder, therefore, that with the burdens of maternity imposed upon them in addition, the wives of working men so frequently break down in health, thus adding to the discomfort of home and contributing to the improper feeding of the children. It

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is only occasionally that the details of a death from starvation come before the public, but there are thousands of men and women in this "Merrie England" of ours eking out an existence upon starvation diets, their wages only allowing them to procure sufficient to keep body and soul together. In investigating these cases I have been struck by the fact that life can be maintained for a long time, and apparently without great harm, upon the barest subsistence diet. It is the very young and the aged who feel the deprivation of food most. When starvation has once passed over a people it is years before the effects are removed. When a student in the hospitals in Paris, shortly after the Franco-German war, my attention was frequently drawn to the large number of cases of consumption, general debility, and anæmia in young men and women, consequent upon the cellar-life and deprivation of food imposed upon the population during the siege. The history of Ireland, too, affords an illustration of the effects of prolonged deficiency of food. Pestilence walks in the trail of starvation. The potato famine in Ireland was followed by relapsing fever, an epidemic which more than decimated the nation, and was as severe a scourge as any of the epidemics of the middle ages.

At what hours of the day we should take our food, of what character it should be and what quantity we should eat, are questions of individual idiosyncrasy, wealth, and appetite. The appetite is certainly a guide, but it is a fallible one. Whilst it deceives people who live too freely by allowing them to gorge themselves, its absence, on the other hand, allows dish after dish of nutritious food to pass without being tasted. There is an old precept attributed to the School of Salerno, that we should rise from the table with still some appetite left. Under no circumstances should people eat to repletion. It is astonishing the amount of food some people eat compared to others who appear to be just as well nourished and quite as healthy, a circumstance which suggests that the average man consumes more than he requires, and that so far as this particular question is concerned each individual must settle it for himself. In the savage state man eats with great irregularity and to excess. His pleasures lie in eating, drinking, and sleeping. His habits are gluttonous. It is when civilisation advances and man becomes engaged in occupation that he finds it necessary to eat at stated times, and that whilst he becomes the bread-winner of the family, woman becomes the cook.

The feeding of the people is an important problem, and one of increasing difficulty as time goes on and the population keeps increasing. It is only necessary to visit large cities, such as Glasgow, Manchester, and London, to observe the prominent part the eating-house, the restaurant, and hotel play in the social life of



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to-day. Cooking in some places has become one of the fine arts of the period, and a cultivation of the palate one of the refinements of modern society. These, with the use of expensive wines, have always gone hand in hand with national prosperity. When Rome was at the height of her grandeur the great meal of the day, the supper or coena, corresponding to our dinner, was one upon which the wealthy families exhausted all the resources of art and luxury. The sums of money expended upon their public banquets were something fabulous. Nothing which money could procure was left unbought. The shores of the Mediterranean, the coasts of Spain and Britain, and the fringes of Libya were searched for dainties to supply the table. A public banquet is known to have cost £40,350. Doubtless the wealth of Rome was great, but it was equalled by the extravagant and luxurious tastes of the people. It is strange how every nation, as it has become wealthy, has imitated in this respect the luxurious habits of the Romans. Is there no resemblance in the national prosperity, the vices and vanity of England of to-day, to the mistress of the world when at the summit of her greatness? The hand of time may not be stayed nor the progress of evolution delayed, but it was plain food, simple habits and simple pleasures, with their physical and moral correlates, that created Great Britain and gave her healthy sons and daughters. Upon their offspring now rests the obligation of upholding the reputation of the mother country, and of maintaining her in the high position she has held amongst the nations as a great social, commercial, and economic power.



